<u>WHAT IS CLAIMED IS</u>:

1   1.   A method for handling failures in a data plane of a plurality of data

2   planes, the method comprising:

3   generating a partitioned data structure, wherein the partitioned data structure

4   includes one or more partitions for each of the plurality of data planes, each partition

5   including routes for a source data plane to a destination data plane;

6   sending one or more partitions from the partitioned data structure to a data

7   plane that is the source data plane in the routes;

8   detecting a failure in a failed data plane in the plurality of data planes; and

9   notifying data planes other than the failed data plane in the plurality of data

10   planes that the failed data plane has failed,

11   wherein the notified data planes do not send data for the one or more routes

12   found in a partition associated with the failed data plane.

1   2.   The method of claim 1, wherein one partition includes all routes from a

2   source data plane and to a destination data plane.

1   3.   The method of claim 1, further comprising removing any data

2   partitions that have been received at the data planes that have the failed data plane as the

3   destination data plane.

1   4.   The method of claim 1, further comprising:

2   detecting when the failure has been restarted; and

3   sending one or more partitions that include the failed data plane as the source

4   data plane in the routes to the failed data plane.

1   5.   The method of claim 1, further comprising:

2   detecting when the failure has been restarted; and

3   notifying the data planes other than the failed data plane that the failure has

4   been restarted, wherein the data planes send data for the one or more routes found in a

5   partition associated with the failed data plane.

1   6.   The method of claim 5, further comprising if any partitions were

2   removed, restoring the removed partitions.

1   7.   The method of claim 6, further comprising sending the removed

2 partitions to each data plane other than the failed data plane.

1   8.   The method of claim 7, wherein the sending step is performed without

2 the control processor.

1   9.   The method of claim 1, further comprising:

2   storing the data structure in persistent storage; and

3   sending one or more partitions to the failed data plane from the persistent

4 storage after the failed data plane is restarted.

1   10.   The method of claim 9, wherein the sending step is performed without

2 the control processor.

1   11.   The method of claim 1, further comprising separating each partition in

2 the partitioned data structure.

1   12.   A method for handling failures in a data plane in a plurality of data

2 planes, the method comprising:

3   generating a partitioned data structure, wherein the partitioned data structure

4 includes one or more partitions for each of the plurality of data planes, each partition

5 including routes for a source data plane to a destination data plane;

6   sending one or more partitions from the partitioned data structure to a data

7 plane that is the source data plane in the routes;

8   detecting when a failure in a failed data plane in the plurality of data planes

9 has been resolved; and

10   sending the failed data plane a partition associated with the failed data plane,

11   wherein the partition allows the failed data plane to resume sending data

12 according to the routes found in the partition.

1   13.   The method of claim 12, further comprising notifying data planes other

2 than the failed data plane that the failed data plane has failed, wherein the notified data planes

3 do not send data for the one or more routes found in a partition associated with the failed data

4 plane.

1   14.   The method of claim 12, further comprising notifying data planes other

2   than the failed data plane that the failure has been resolved, wherein the notified data planes

3   resume sending data for the one or more routes found in a partition associated with the failed

4   data plane.

1   15.   The method of claim 12, wherein one partition includes all routes from

2   a source data plane and to a destination data plane.

1   16.   The method of claim 12, further comprising removing any data

2   partitions that have been received at the data planes that have the failed data plane as the

3   destination data plane.

1   17.   The method of claim 16, further comprising if any partitions were

2   removed, restoring the removed partitions.

1   18.   The method of claim 17, further comprising sending the removed

2   partitions to each data plane other than the failed data plane.

1   19.   The method of claim 18, wherein the sending step is performed

2   without the control processor.

1   20.   The method of claim 12, further comprising:

2   storing the data structure in persistent storage; and

3   sending one or more partitions to the failed data plane from the persistent

4   storage after the failed data plane is restarted.

1   21.   The method of claim 20, wherein the sending step is performed

2   without the control processor.

1   22.   The method of claim 12, further comprising separating each partition

2   in the partitioned data structure.

1   23.   A method for generating and distributing a route data structure, the

2   method comprising:

3   receiving a plurality of routes for a plurality of data planes;

4   determining, for each route, a source data plane in which data is sent and a

5   destination data plane in which data is received;

6   storing each route in a separate data partition depending on the source data

7   plane and the destination data plane associated with the route, wherein all routes for the same

8   source and destination data plane are stored in the same data partition; and

9   distributing the each separate partition to a data plane, wherein partitions

10   including routes for the source data plane are sent to that source data plane.

1   24.   The method of claim 23, further comprising:

2   storing partitions in persistent storage, wherein the stored partitions are sent to

3   a data plane that had failed after the failure has been restarted.

1   25.   A system for handling data plane failures, the system comprising:

2   a plurality of data planes; and

3   a control processor comprising:

4   a receiver configured to received routes for route data, each route

5   specifying source data plane in which data is sent and a destination data plane in which data

6   is received;

7   a data structure generator configured to generate a data structure that

8   groups the routes by a source data plane for each of the plurality of data planes; and

9   a distributor configured to distribute the grouped routes to each

10   associated source data plane,

11   wherein the plurality of data planes comprise storage for storing the grouped

12   routes that are received from the distributor.

1   26.   The system of claim 25, wherein the control processor comprises a

2   failure detector configured to detect a failure in a data plane in the plurality of data planes.

1   27.   The system of claim 26, wherein the control processor comprises a

2   notifier, the notifier configured to notify data plane of the failure.

1   28.   The system of claim 27, wherein the data planes are configured to not

2   send data to a failed data plane upon the notification.

1   29.   The system of claim 27, wherein the data planes are configured to

2   remove a partition associated with the failed data plane upon the notification.

1   30.   The system of claim 25, wherein the control processor comprises a

2   detector configured to detect when a failure in a data plane has been restarted.

1   31.   The system of claim 30, wherein the control processor comprises a

2   notifier configured to notify the data planes other than the failed data plane that the failure

3   has been restarted.

1   32.   The system of claim 31, wherein the data planes other than the failed

2   data plane are configured to start sending data to the data plane whose failure had been

3   restarted.

1   33.   The system of claim 31, wherein the data planes other than the failed

2   data plane are configured to reinstate the partitions associated with the failed data plane

3   whose failure has been restarted.

1   34.   The system of claim 31, wherein the distributor is configured to send

2   the failed data plane whose failure has been restarted partitions that have the failed data plane

3   as the source data plane.